

MIXED ORTHOGONAL ARRAYS

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Experiment plans formed by merging two or more designs, such as orthogonal arrays primarily with 2- and 3-level factors, creating multi-level arrays with subsets of different strength are proposed for computer experiments. The specific illustrations here are designs for 5-level factors with fewer runs than generally required for 5-level orthogonal arrays of strength 2 or more. At least five levels for each input are desired to allow for runs at a nominal value, two values either side of nominal but within a normal, anticipated range, and two more extreme values either side of nominal. This number of levels allows for a broader range of input combinations to test the input combinations where a simulation code operates. Five-level factors also allow the possibility of up to 4th order polynomial models for fitting simulation results, at least in one dimension. By having subsets of runs with more than strength 2, interaction effects may also be considered. Also, the resulting designs have a “checker-board” pattern in lower-dimensional projections. This appears to be more space-filling than the usual grid projection that occurs with orthogonal arrays.